

**Notice of Allowability**

Application No.

10/644,565

Examiner

Victor J. Taylor

Applicant(s)

MOORE, IAN

Art Unit

2863

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 20 July 2004.
2. ☒ The allowed claim(s) is/are 1-17 and 21-23.
3. ☒ The drawings filed on 15 August 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
  1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 6
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

## **DETAILED ACTION**

### ***Prior Art***

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

I. Art A of Chambers in US 6,018,500 in class 367/073 is cited for the method radon move out in a conventional CMP gather and teaches steps of transforms from t-x space to the Tau-p domain and teaches steps of windowing the data sets or zoning the plurality of data sets with each data set having the common range of selected independent characteristics and teaches steps of shifting the zero ordinate of the p-axis centered through the contents of the retained data set and teaches steps of inverse transforming this data set back to the t-x space. And teaches steps of repeating these processing steps on the remaining windowed data sets in figure 10 and further teaches steps of convolving seismic data in a plurality of CMP gathers in lines 1-65 of column 4.

II. Art B of Chambers et al., US 5,970,023 is cited for the method for reducing aliasing artifacts in seismic data processing using Tau-p radon transforms, and further teaches using the marine water seismic data in figure 1 and further teaches processing seismic marine CMP gathers recorded in the t-x space and corrected for the hyperbolic move out in lines 1-65 of column 3 and 4.

### ***Allowable Subject Matter***

2. Claims 1-17, and 21-23 are allowed. The applicant has canceled claims 18-20
3. The following is an examiner's statement of reasons for allowance:

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## Claim 1

I. The method in claim 1 of attenuating water layer multiples from a gather of seismic data traces, using the method steps of “applying a convolutional operator to the gather of seismic data traces...” with the method steps of “adaptively subtracting the receiver side water layer multiples from the gather of seismic data traces to generate a modified version of the gather...” [And] with the steps of “removing a water bottom primary from the modified version of the seismic data traces to create a second modified version of the gather of seismic data traces”...[and] with the steps of “applying the convolutional operator to the second modified version of the gather... combined with the steps of predicting a plurality of source side water layer multiples contained in the gather of seismic data traces” and in combination with the particularly claimed steps of “adaptively subtracting the receiver side water layer multiples and the source side water layer multiples from the seismic gather”, and/or in combination with the particularly claimed steps of “used to generate a plurality of primaries contained in the gather of seismic data traces” is not found in the cited art of record.

The prior art A of Chambers in US 6,018,500 in class 367/073 teaches the method of radon move out used in a conventional CMP gather and further teaches steps for transforming from t-x space to the Tau-p domain, and teaches steps of windowing the data sets or zoning the plurality of data sets using each data set having the common range of selected independent characteristics, and teaches steps of shifting the zero ordinate of the p-axis centered through the contents of the retained data set, and teaches steps of inverse transforming this data set back to the t-x space.

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And further teaches steps of repeating these processing steps on the remaining windowed data sets in figure 10 and further teaches steps of convolving the seismic data in a plurality of CMP gathers in lines 1-65 of column 4.

The prior art B of Chambers et al., US 5,970,023 teaches method steps for reducing the aliasing artifacts in seismic data and teaches data processing using Tau-p radon transforms, and further teaches steps of using the marine water seismic data in figure 1 and further teaches steps of processing seismic marine CMP gathers recorded in the t-x space and corrected for the hyperbolic

Therefore, the prior art Chambers and The prior art of Chambers et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 2-10, and 21 that are dependent on the allowed independent claim 1 are allowed at least for the reason cited above.

II. The method in claim 11 of attenuating water layer multiples from a gather of seismic data traces, using the method steps of "forming the gather of seismic data traces in a t-x domain" with the method steps of transforming the gather of seismic data traces from the t-x domain to a tau-p domain" with the method steps of convolving the gather of seismic data traces with a convolutional operator to predict a first set of water layer multiples contained in the gather ..." with the method steps of "adaptively subtracting the first set of water layer multiples from the gather of seismic data traces"...

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[and] with the steps of “removing a water bottom primary from the gather of seismic data traces”...[and] with the steps of “convolving the convolutional operator with the gather of seismic data traces after the first set of water layer multiples has been adaptively subtracted from the seismic data traces and the water bottom primary has been removed from the gather of seismic data traces to predict a second set of water layer multiples contained in the gather of seismic data traces”... and combined with the steps or in combination with the particularly claimed steps of “ adding the first set of water layer multiples...” with the steps of transforming the sum of the first set...and the second set...from the tau-p domain to the t-x domain”... or in combination with the particularly claimed steps of “adaptively subtracting the transformed sum of the first set... and the second set...in the t-x domain to generate a plurality of primaries contained in the gather” is not found in the cited art of record.

The prior art A of Chambers in US 6,018,500 in class 367/073 teaches the method of radon move out used in a conventional CMP gather and further teaches steps for transforming from t-x space to the Tau-p domain, and teaches steps of windowing the data sets or zoning the plurality of data sets using each data set having the common range of selected independent characteristics, and teaches steps of shifting the zero ordinate of the p-axis centered through the contents of the retained data set, and teaches steps of inverse transforming this data set back to the t-x space. And further teaches steps of repeating these processing steps on the remaining windowed data sets in figure 10 and further teaches steps of convolving the seismic data in a plurality of CMP gathers in lines 1-65 of column 4.

The prior art B of Chambers et al., US 5,970,023 teaches method steps for reducing the aliasing artifacts in seismic data and teaches data processing using Tau-p radon transforms, and further teaches steps of using the marine water seismic data in figure 1 and further teaches steps of processing seismic marine CMP gathers recorded in the t-x space and corrected for the hyperbolic

Therefore, the prior art Chambers and The prior art of Chambers et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 12-17 and 22 that are dependent on the allowed independent claim 11 are allowed at least for the reason cited above.

III. The method in claim 23 of attenuating water layer multiples from a gather of seismic data traces, using the method steps of "forming the gather of seismic data traces in a t-x domain" with the method steps of transforming the gather of seismic data traces to a tau-p domain" with the method steps of applying convolving a convolutional operator to predict a plurality of receiver side multiples..." with the method steps of "adaptively subtracting the first receiver side water layer multiples from the gather of seismic data traces...to generate a modified version of the gather"...[and] with the steps of "removing a water bottom primary from the gather of seismic data traces..."[and] with the steps of "applying the convolutional operator with the second modified gather of seismic data traces to predict a plurality of source side water layer multiples..." and

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combined with the steps or in combination with the particularly claimed steps of “ adding the receiver side of water layer multiples...” with the steps of transforming the sum of the receiver side multiples...and the source side multiples...from the tau-p domain to the t-x domain”... or in combination with the particularly claimed steps of “adaptively subtracting the receiver side multiples...and the source side multiples...from the gather to generate a plurality of primaries contained in the gather” is not found in the cited art of record.

The prior art A of Chambers in US 6,018,500 in class 367/073 teaches the method of radon move out used in a conventional CMP gather and further teaches steps for transforming from t-x space to the Tau-p domain, and teaches steps of windowing the data sets or zoning the plurality of data sets using each data set having the common range of selected independent characteristics, and teaches steps of shifting the zero ordinate of the p-axis centered through the contents of the retained data set, and teaches steps of inverse transforming this data set back to the t-x space. And further teaches steps of repeating these processing steps on the remaining windowed data sets in figure 10 and further teaches steps of convolving the seismic data in a plurality of CMP gathers in lines 1-65 of column 4.

The prior art B of Chambers et al., US 5,970,023 teaches method steps for reducing the aliasing artifacts in seismic data and teaches data processing using Tau-p radon transforms, and further teaches steps of using the marine water seismic data in figure 1 and further teaches steps of processing seismic marine CMP gathers recorded in the t-x space and corrected for the hyperbolic

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Therefore, the prior art Chambers and The prior art of Chambers et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

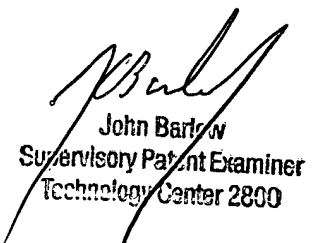
**Conclusion**

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 517-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJT

  
22 July 2004

  
John Barlow  
Supervisory Patent Examiner  
Technology Center 2800